Coeur d'Alene Lake and River (17010303) Sub-basin Assessment and Proposed Total Maximum Daily Loads

Idaho Department
of Health and Welfare
Division of
Environmental Quality

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1. Executive Summary of the Coeur d'Alene Lake and River (17010303) Sub-basin Assessment and Proposed Total Maximum Daily Loads

The Coeur d'Alene Lake and River Sub-basin consists of the Coeur d'Alene Lake and River and those water bodies which drain directly to the river and the lake. The sub-basin contains 30 water bodies which have been listed as water quality limited on the Section 303(d) Clean Water Act lists. The beneficial uses of these streams and lakes are generally cold water biota and primary contact recreation although the river and the lake and a few additional lakes have more extensive beneficial uses designated in the Idaho water quality standards. These water bodies are listed for one or more of the following pollutants: bacteria, habitat alteration, nutrients, sediment, dissolved oxygen, oil and grease, pH and temperature.

The existing data for each of the water bodies is reviewed in the sub-basin assessment. Where those data were inconclusive, additional data on bacteria, nutrients and temperature were collected during the summer months of 1999. The sediment generation of the watersheds of those water bodies listed as limited by excess sedimentation was modeled. Following analysis of the data and the modeling results, eighteen water bodies in the sub-basin were verified to be water quality limited by at least one pollutant: eleven for temperature, eight for sediment and one for bacteria. Fernan Lake was not found limited, but nutrient levels are sufficiently high to warrant an advisory total maximum daily load (TMDL). The temperature TMDLs have been deferred by the state until state temperature criteria are fully examined and if necessary adjusted. The sediment limitations in the upper two segments of the Coeur d'Alene River can practically be addressed by sediment TMDLs for the North and South Forks of the Coeur d'Alene River. Lake Creek, which is sediment limited, is wholly on the Coeur d'Alene Reservation and the lead agency responsible is EPA.

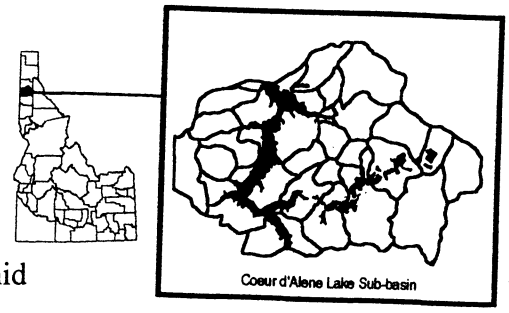
Proposed total maximum daily loads for sediment were developed for Wolf Lodge Creek including its tributary Cedar Creek, Cougar Creek, Mica Creek and Latour Creek including its tributaries Baldy and Larch Creeks. A TMDL for bacteria was developed for Mica Creek.

A thirty-day public comment period was provided from November 18 through December 17, 1999. Three letters of comment containing twenty-three substantive comments were received by the close of the comment period. The draft TMDLs were revised based on the comment recieved. A responsiveness summary discusses all the comments received.

2. COEUR D'ALENE LAKE AND RIVER SUB-BASIN (17010303) ASSESSMENT

2.0 Coeur d'Alene Lake and River Sub-basin Water Quality at a Glance

Water Quality at a Glance:



Hydrologic Unit Code	17010303
Water Quality Limited Segments	Coeur d'Alene Lake and River with several tributaries
Beneficial Uses Affected	Cold Water Biota, Salmonid Spawning, Recreation
Pollutants of Concern	Sediment, temperature
Known Land Uses	Forestry, agriculture, urban

2.0.1 Prologue:

The impacts of the trace (heavy) metals cadmium, lead and zinc have been addressed in assessments of the Coeur d'Alene River and the Coeur d'Alene Lake Plan (IDEQ, 1996a; IDEQ, 1998a). Total maximum daily load documents have been developed for these pollutants (IDEQ, 1998b; IDEQ, 1998c). This sub-basin assessment addresses the non-metallic pollutants of concern. For background on the lake and the river the reader is referred to the documents cited.

2.1. Characterization of the Watershed

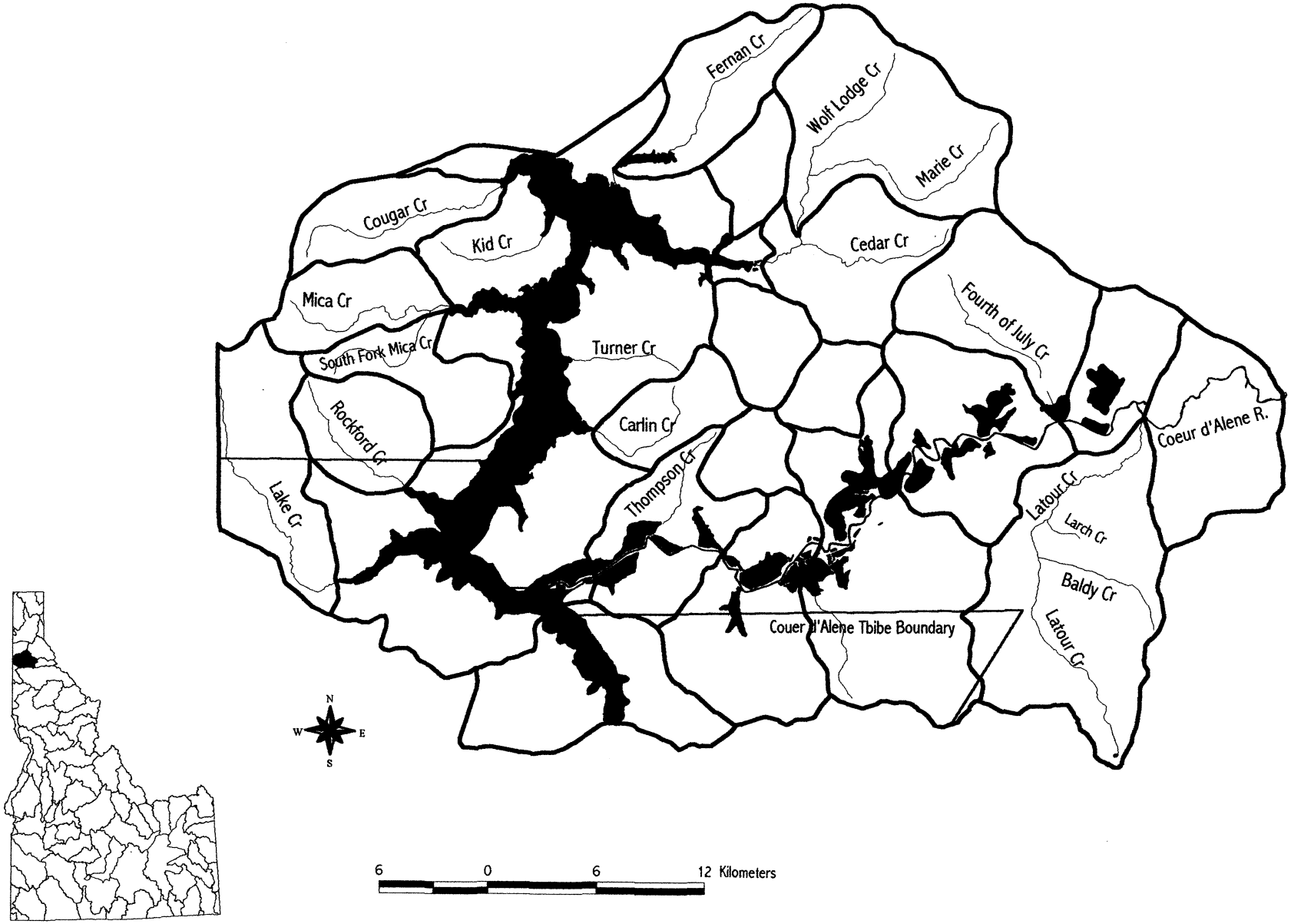
The Coeur d'Alene Lake and River sub-basin (17010303) includes Coeur d'Alene Lake and the Coeur d'Alene River[1] and the tributaries to these two water bodies (figure 1). The Coeur d'Alene River flows from the confluence of the North and South Forks of the Coeur d'Alene Rivers near Enaville, Idaho westward to its discharge to the Lake Coeur d'Alene near Harrison, Idaho (Figure 1). The City of Coeur d'Alene is located at the northern end of the lake. The Spokane River flows from the lake outlet into the State of Washington.

2.1.1. Physical and Biological Characteristics

The physical and biological characteristics of the sub-basin are described in the following sections on climate, hydrology, landform, geology and soils, vegetation, aquatic fauna and cultural impacts.

[1] The Coeur d'Alene River above the South Fork Coeur d'Alene River was renamed the North Fork Coeur d'Alene River in 1991. (U.S. Board of Geographic Names, 1991.)

Figure 1. Coeur d'Alene Lake and River Sub-basin HUC 17010303



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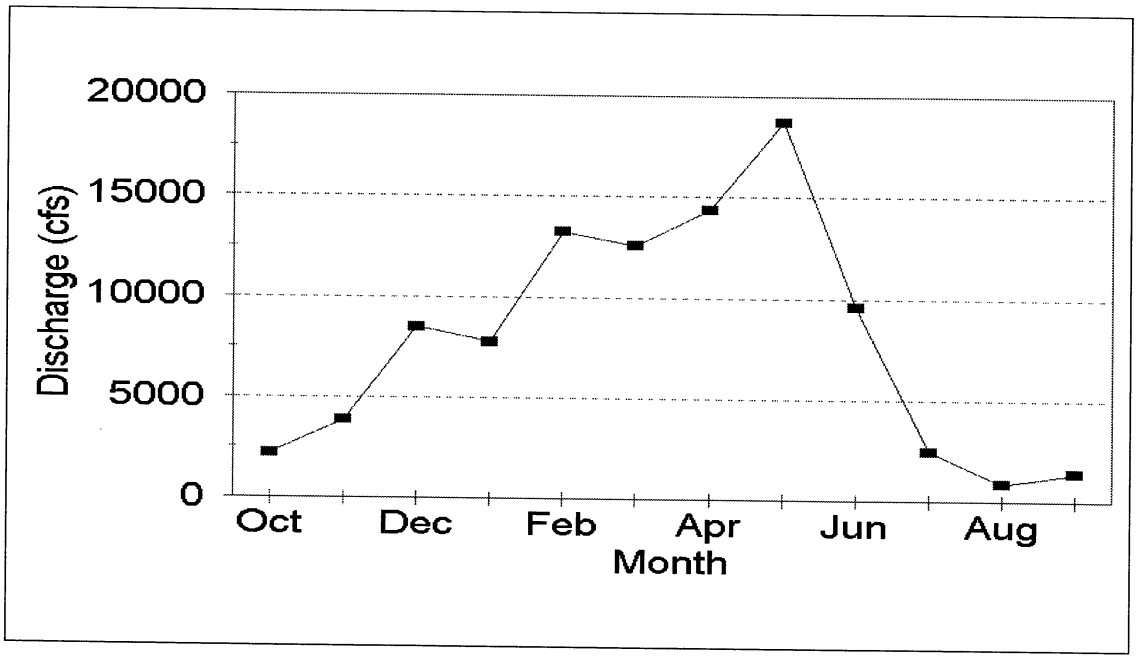
2.1.1.1 Climate

The Coeur d'Alene Lake sub-basin is located in the Northern Rocky Mountain physiographic region to the west of the Bitterroot Mountains. Local climates are influenced by both pacific maritime air masses from the west as well as continental air masses from Canada to the north. The annual weather cycle generally consists of cool to warm summers with cold and wet winters. The relative warmth of summers or winters depends on the dominance of Pacific or continental air masses. Precipitation is most generous in the winter months. Precipitation takes the form of rain generally below 3,000 feet of elevation, while it is in the form of snow above 4,500 feet. The transitional zone between 3,000 and 4,500 feet holds a transient snow pack, which is subject to rapid melt when wet Pacific air masses predominate. The result of these snow melt events are high discharge rain on snow events.

2.1.1.2. Hydrology

The discharge hydrograph of the Spokane River near Post Falls Idaho and immediately downstream of the lake outlet is provided in Figure 2. The discharge of the streams of the sub-basin is dominated by the spring snow melt. The streams draining the Coeur d'Alene and St. Joe Mountains have watersheds predominantly in the elevation range (3,000 - 4,500 feet) subject to winter "rain on snow" discharge events. The relative low elevation of the watersheds causes earlier maximum discharge (mid-March), than from the majority of the watersheds of the North and South Forks of the Coeur d'Alene River. The immediate watersheds of the river and the lake are 34.8% of the total watershed. For this reason the river and the lakes' stage are little affected by the discharge of these streams.

Figure 2: Mean Monthly Discharge of the Post Falls Station 1995-1999.



2.1.1.3 Land forms, Geology and Soils

The Coeur d'Alene River flows through a generally broad floodplain ranging from a quarter to one and three-quarters miles in width. The river and its floodplain are bound on the north by the Coeur d'Alene Mountains and on the south by the St. Joe Mountains. Coeur d'Alene Lake is a submerged river valley impounded initially by the outwash of the Pleistocene Missoulian floods. The lake has been augmented by the Post Fall Dam. Tributaries to the river and the eastern shore of the lake flow from the Coeur d'Alene and St. Joe Mountains. Tributaries to the lake from the west flow either from the Palouse Hills or from the most southerly mountains of the Selkirk Range.

Eleven lakes and numerous wetlands are located laterally to the river below Rose Lake. The lakes vary in size, while the wetlands surrounding them are extensive. The lakes and wetlands are expressions of the high water table of the lower river valley. The lakes are hydrologically connected to the river by surface channels in all but three cases where the connection is through the valley aquifer. Large wetlands are found in the valley above Rose Lake, notably in the area of Cataldo Flats.

The Coeur d'Alene and St. Joe Mountains are composed primarily of Belt Supergroup meta-sedimentary rocks. This geology weathers to predominantly silt size particles with rounded cobbles as the primary transitional material found in the higher gradient streams. The Selkirk Range, from which streams flowing from the northwest drain to the lake, is a granitic formation. These granite substrates weather to sand. The predominant bedload of these streams is sand. The surface soils of the Palouse Hills are largely composed of wind blown silt. The soil is underlain by Columbia River basalt. The basalt is found at the surface near the lake shore. The division between granitic sands of the Selkirk Range and the silts of the Palouse Hills occurs at the northern end of the Lake Creek watershed.

Tributaries to the river and lake flowing from the mountains are high gradient streams channels (Rosgen B), until they reach the valley bottoms. As these streams enter the valley of the river or the lake, an abrupt transition to low gradient (Rosgen C) channels occurs in their final half mile in the case of the river and final few miles in the case of tributaries to the lake. Streams flowing from the Palouse Hills have lower gradients near their headwaters, but have steep channels over basalt deposits as these streams approach the lake.

2.1.1.4. Vegetation

The predominant vegetation of the Coeur d'Alene, St. Joe and Selkirk Mountains which comprise 80% of the sub-basin is mixed coniferous forest. Dominant conifers are pines, true fir, Douglas fir, tamarack and red ceder. Cottonwood, aspen and alder are the predominant deciduous species. The Palouse Highlands have grasslands as well as wooded areas. These areas were likely maintained by fire as grasslands prior to European settlement. Grasslands and wooded areas would have expanded and contracted dependent on the fire cycle which was controlled by the indigenous people. Valley bottoms with little slope are currently grasslands. Vegetation along

the Coeur d'Alene River has been diminished by bank erosion and the influence of fluvially deposited metals contaminated sediments. The metals bind phosphate making it less available for plant nutrition. The result is a diminished vegetative cover in some areas. For additional information on the vegetation of the Coeur d'Alene Basin refer to the Coeur d'Alene Lake Management Plan (IDEQ, 1996a).

2.1.1.5. Aquatic Fauna

The native trouts of the sub-basin's streams are cutthroat trout and bull trout. Sculpin, shiners and bullhead catfish are also indigenous. The tailed frog, giant salamander and turtles completed the list of indigenous vertebrate species. The fish fauna of the lake and the river have been greatly altered by the introduction of several trouts, salmon and warm water species. A detailed discussion of the current fishery of Coeur d'Alene Lake and River is available in the Coeur d'Alene Lake Management Plan (IDEQ, 1996a). Although the lake and river have highly altered aquatic fauna due to introductions, headwater streams retain native species with the addition of rainbow and brook trout and the loss of bull trout. Although fish composition appears stable in the headwaters, fish abundance is generally believed to be reduced from historic levels reported as the area was settled. Fish abundance in Coeur d'Alene Lake and River as well as the lateral lakes is high (IDEQ, 1996a).

2.1.2 Cultural Impacts:

The watersheds of the Coeur d'Alene and St. Joe Mountains which drain to the river and the lake are managed primarily for timber production and dispersed recreation. Timber management has been moderately intense with large clear-cut areas and dense road development. Some watersheds as Wolf Lodge and Cedar Creeks have had intense forest management and road development. Land management in this area is primarily by the U.S. Forest Service. Watersheds of the southern Selkirk mountains are also managed primarily for timber production. These tracts are in private and industry ownership. Some forested watersheds on either side of the lake were logged using railroad systems. Near the population centers of Coeur d'Alene, Harrison and the intervening east lake shore, timber management has been less intense to protect scenic values.

From the Lake Creek watershed south in the Palouse Hills region and on Harrison Flats east of the lake, agriculture is the major land use. The Palouse area and Harrison Flats supported wheat production over most of the history of cultivation. In recent years blue grass seed production has replaced some wheat production. Substantial farm land acreage has been placed in the Conservation Reserve Program.

The main population center in the sub-basin is the City of Coeur d'Alene at the north end of the lake. In some nearby watersheds residential development is prevalent. Fernan and Cougar Creeks are examples of watersheds which have residential development. Residences exist in strips along the east and west shore of the lake more or less continuously. Many of these residences are summer cabins but many have become year around residences in recent years. Additional population centers include Harrison, Worley, Plummer, Rose Lake and Cataldo. These towns have populations less

than 300. For additional information on the land use and demographics of the Coeur d'Alene Basin refer to the Coeur d'Alene Lake Management Plan (IDEQ, 1996a).

2.2. Regulatory Requirements

The regulatory requirements for the water bodies of the sub-basin are summarized by listing the segments of concern, the assigned beneficial uses and the water quality standards supportive of those uses.

2.2.1. Segments of Concern

The stream segments listed in the 1998 Section 303(d) Clean Water Act List for non-metallic pollutants in sub-basin 17010303 are provided in Table 1.

Table 1: List of 1998 Section 303(d) Clean Water Act listed water bodies.

Water body Name	HUC Number	Boundaries	Pollutant(s)
Cd'A River	17010303 4021	SF Cd'A R to French Gulch	Habitat alteration, pH and sediment
Cd'A River	17010303 4018	French Gulch to Skeel Gulch	Habitat alteration, pH and sediment
Cd'A River	17010303 4022	Skeel Gulch to Latour Creek	Habitat alteration, pH and sediment
Cd'A River	17010303 4019	Latour Creek to Fourth of July Creek	Habitat alteration, pH and sediment
Cd'A River	17010303 4017	Fourth of July Creek to Fortier Creek	Habitat alteration, pH and sediment
Cd'A River	17010303 4016	Fortier Creek to Robinson Creek	Habitat alteration, pH and sediment
Cd'A River	17010303 4020	Robinson Creek to Cave Lake	Habitat alteration, pH and sediment
Cd'A River	17010303 4015	Cave Lake to Black Lake	Habitat alteration, pH and sediment
Cd'A River	17010303 3529	Black Lake to Thompson Lake	Habitat alteration, pH, temperature and sediment
Cd'A River	17010303 4023	Thompson Lake to Cd'A Lake	Habitat alteration, pH and sediment
Latour Creek	17010303 3535	Headwaters to Cd'A River	Bacteria, habitat alteration, sediment and temperature
Baldy Creek	17010303 7535	Headwaters to Latour Creek	Bacteria, habitat alteration, sediment and temperature
Larch Creek	17010303 7536	Headwaters to Latour Creek	Bacteria, habitat alteration, sediment and temperature
Fourth of July Creek	17010303 3534	Headwaters to Cd'A River	Habitat alteration and sediment

Water body Name	HUC Number	Boundaries	Pollutant(s)
Willow Creek	17010303 3531	Headwaters to Cd'A River	Sediment
Black Lake	17010303 7529		Nutrients
Thompson Creek	17010303 3530	Headwaters to Cd'A River	Habitat alteration and sediment
Wolf Lodge Creek	17010303 3541	Headwaters to Cd'A Lake	Bacteria, habitat alteration, nutrients and sediment
Marie Creek	17010303 7541	Searchlight Creek to Wolf Lodge Creek	Habitat alteration
Cedar Creek	17010303 3541	Headwaters to Wolf Lodge Creek	Habitat alteration, oil and gas and sediment
Fernan Lake	17010303		Nutrients
Fernan Creek	17010303 3543	Fernan Lake to Cd'A Lake	Bacteria, dissolved oxygen, habitat alteration, nutrients and sediment
Cougar Creek	17010303 3545	NF Cougar Creek to Cd'A Lake	Habitat alteration, nutrients and sediment
Kidd Creek	17010303 3546	Headwaters to Cd'A Lake	Habitat alteration, nutrients and sediment
North Fork Mica Creek-Mica Creek	17010303 3547	Headwaters to Cd'A Lake	Bacteria, dissolved oxygen, habitat alteration, nutrients and sediment
Lake Creek	17010303 3549	House(Kruse?) Creek to Cd'A Lake	Sediment

Additional water bodies had been listed on the 1996 list. These are listed in Table 2. These water bodies were removed from the list when analysis of more recent water quality data indicated these streams are not presently water quality limited (IDEQ 1996c).

Table 2: List of additional water bodies included on the 1996 Section 303(d) list, but delisted as a result of sufficiently high water quality scores.

Water body	HUC Number	Boundaries	Pollutant(s)
Carlin Creek	17010303 3538	Headwaters to Cd'A Lake	Sediment
Turner Creek	17010303 3539	Headwaters to Cd'A Lake	Sediment
Fernan Creek	17010303 3544	Headwaters to Fernan Lake	Habitat alteration, nutrients, sediment and pathogens
Rockford Creek	17010303 3548	Headwaters to Cd'A Lake	Habitat alteration, nutrients and sediment

2.2.2. Beneficial Uses

Of the listed water bodies, the Coeur d'Alene River, Wolf Lodge Creek and Fernan Lake and its outlet creek have beneficial uses specifically designated in the Idaho Water Quality Standards

(IDAPA 16.01.02.) Beneficial uses of the other listed water bodies would be, by interpretation of the standards, cold water biota and secondary contact recreation (IDAPA 16.01.02101.01.a).

The Coeur d'Alene River has designated uses in the Idaho water quality standards (IDAPA 16.01.02110,01.ee.) of agricultural water supply, cold water biota, primary and secondary contact recreation and salmonid spawning. A use attainability and beneficial use status assessment was completed for the waters of the Coeur d'Alene Basin during 1992 (Hartz, 1993). All the designated uses were assessed as attainable. The river was assessed to be supporting agricultural water supply, primary and secondary contact recreation uses. Both cold water biota and salmonid spawning were assessed to be partially supported due primarily to exceedences of the zinc standard for the support of freshwater biota in the water column and concern that contaminated sediments may be affecting the freshwater biota through food chain interactions. Although Ellis (1940) reported the Coeur d'Alene River to be nearly devoid of all life to its mouth, more recent studies (Bauer, 1975; Hornig, Terpening and Bogue, 1988) indicate that self-sustaining populations of fish and macroinvertebrate species have returned to the river and the lakes of its floodplain. Macro-invertebrate numbers appear lower near the mouth and in the lower reaches of the river as compared to the control areas in the St. Joe River (Skille et. al., 1983). Phytoplankton productivity may also be affected by metals in the water column (Rabe, Wissmar and Minter, 1973). Adfluvial cold water fish (west slope cutthroat and bull trout (indigenous) and Chinook and Kokanee Salmon (introduced)) use the Coeur d'Alene River as a migratory route (Horner, personal comm.). A more thorough discussion of the Coeur d'Alene River and the lakes of its floodplain is provided in the Coeur d'Alene River Problem Assessment (IDEQ, 1997).

Wolf Lodge Creek (PB-360S) has designated uses of domestic water supply, agricultural water supply, cold water biota, salmonid spawning and primary and secondary contact recreation (IDAPA 16.01.02110,01.hh.). Fernan Lake and its outlet creek (PB-350S) have designated use of domestic water supply, agricultural water supply, cold water biota, salmonid spawning and primary and secondary contact recreation (IDAPA 16.01.02110,01.oo.).

2.2.3. Water Quality Standards

Water quality standards supportive of the designated beneficial uses are stated in the Idaho Water Quality Standards and Wastewater Treatment Requirements (IDHW 1996b). The criteria supporting the beneficial uses are outlined in Table 3. In addition to these criteria cold water biota and salmonid spawning are supported by two narrative criteria. The narrative sediment criterion states:

Sediment shall not exceed quantities specified in section 250 or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350.02.b.(IDAPA 16.01.02.200.08).

The excess nutrients criterion states:

Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other aquatic growths impairing designated beneficial uses. (IDAPA 16.01.02.200.06).

Table 3: Water quality criteria supportive of beneficial uses.

Designated Use	Primary Contact Recreation	Secondary Contact Recreation	Cold Water Biota	Salmonid Spawning
Coliforms and pH	500 FC/100mL	800 FC/100mL	pH between 6.5 and 9.5	pH between 6.5 and 9.5
Coliforms and dissolved gas	200 FC/100mL geometric mean over 30days	400 FC/100mL geometric mean over 30 days	dissolved gas not exceeding 110%	dissolved gas not exceeding 110%
chlorine			total chlorine residual less than 19 ug/L/hr or an average 11 ug/L/4 day period	total chlorine residual less than 19 ug/L/hr or an average 11 ug/L/4 day period
toxics substances			less than toxic substances set forth in 40 CFR 131.36(b)(1) Columns B1, B2, D2	less than toxic substances set forth in 40 CFR 131.36(b)(1) Columns B1, B2, D2
dissolved oxygen			exceeding 6 mg/L D.O.	exceeding 5 mg/L intergravel D. O.; exceeding 6 mg/L surface
temperature			less than 22°C (72°F) instantaneous; 19°C (66°F) daily average	less than 13°C (55°F) instantaneous; 9°C (48°F) daily average
ammonia			low ammonia (formula/tables for exact concentration	low ammonia (formula/tables for exact concentration
turbidity			less than 50 NTU greater than background instantaneous; 25 NTU over 10 days greater than background	

2.3. Water Quality Concerns and Status

The water quality concerns and status are addressed in the following sections by identifying potential pollutant sources and reviewing the existing data for the listed water bodies.

2.3.1. Pollutant Sources

The water bodies of the sub-basin placed on the 1996 list have reported pollutant exceedences for one or more of the following pollutants: bacteria, habitat alteration, nutrients, sediment, dissolved oxygen, oil and grease, pH and temperature. In most cases bacterial contamination would be predominantly from livestock grazing. Habitat alteration can occur from several actions. An incomplete list of these actions would include nearby road construction, removal of riparian vegetation, channelization or excess sedimentation. Excess nutrients normally are the result of human residential development or livestock grazing activities in the waters under assessment. Nutrients may also naturally build up in a lake over time causing a naturally eutrophic lake. Shallow lakes which have limited water flow through the lake on an annual basis are more likely to be